

eLearner Experience Model

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Abstract: In literature, there have been many e-learning artefacts developed and promoted based on their ability to enhance learning and e-learner experience. However, there is lack of a precise definition of e-learner experience in literature. This paper discusses e-learner experience model along with its roots in: (i) e-learning domain research and (ii) user experience/usability. It also proposes a definition for the e-learner experience model based on the particularities of e-learning. The proposed e-learner experience model has been derived by performing state of the art literature review. The proposed model consists of different constructs and this paper presents analysis of these constructs to measure their effectiveness and evaluating e-learner experience in an e-learning environment. Preliminary assessment of the proposed model indicates promising results to be further investigated as future work.

Keywords: e-learner experience, e-learning evaluation, learner modelling, user experience, usability, Technology-Enhanced Learning/e-learning.

1. Introduction

The aim of adopting e-learning technologies is enhancing the learning process and increasing its efficiency, effectiveness and flexibility [1]. Frequent use of technology-enhanced learning (TEL) term, which is another term used to describe e-learning, reflects the strong link between e-learning and the notion of enhancement in learner's experience. However, literature evidence shows that it is not clear what is meant by enhancement as well as the components targeted by this enhancement [2]. Furthermore, it is not obvious how to measure the proposed enhancement in TEL. Is it related to technology, institutional, processes, stakeholder (i.e. learner and instructor) or content aspects? Though e-learner experience has been researched in a number of studies (e.g. [3]), it has been restricted to certain aspects such as student perceptions or usability. More comprehensive evaluation approaches have been proposed such as [4] but they lack the precise definition of what constituting an e-learner experience model. In this regard, this paper is an attempt to clarify and present e-learner experience model that can be used to assess the effectiveness of a particular e-learning approach. The rest of this paper is organized as follows: section two discusses the concepts of e-learner experience model along with its roots; section three describes the constructs of the proposed e-learner experience model; section four elaborates further on two main aspects of the model (i.e. structural and measurement) to suggest weights to different model

constructs; section five proposes a scale for those constructs to measure the overall effectiveness of the model; section six reflects on some modelling issues and section seven concludes the paper.

2. The e-Learner Experience Model

Investigating the e-learner experience has its roots in two different research domains: (i) e-learning and (ii) user experience or usability. From the e-learning perspective, different researchers pay attention to the added value of e-learning. In most cases, researchers use the results of assessment elements (e.g. exams) and other tools (e.g. self-completion surveys) to measure the enhancements brought by a technology to the learning domain. Moreover, they combine different e-learning aspects (e.g. the quality of learning [5], currency of e-learning contents [6], supporting students and student perceptions) in unstructured way which impacts evaluation efficiency. In contrast, from user experience or usability perspective, researchers commonly ignore the particularities of e-learning research and focus on user experience and hence the objectives of e-learning are often not considered. In addition, user experience research focus moved towards leisure and, therefore, factors such as context of use and anticipated use are rarely investigated [7].

The above literature/discussion shows that user experience and usability have been researched for a while. However, they have not been holistically investigated in the context of e-learning. Usability, as

defined in ISO 9241, refers to “the effectiveness, efficiency and satisfaction with which specified users achieve specified goals in particular environments” [8]. While user experience (UX), as defined in ISO 9241-210, refers to “a person’s perceptions and responses that result from the use and/or anticipated use of a product, system or service” [9]. Two schools of thought exist in the literature regarding the relationship between usability and UX. The first school considers the user experience as an elaborated form of one of the usability metrics which is the user satisfaction, while the second school of thought, adopted in this research, affirmed that usability is subsumed by user experience. Nonetheless, user experience includes usability, cognitive, socio-cognitive and affective aspects of users’ experience such as users’ enjoyment, desire to repeat the system use, and enhanced mental models [10]. This suggests identifying e-Learner Experience Model (eLEM) based on the combination of UX and e-learning domains. This model should define what constitutes the e-learner experience and how can it be evaluated/measured. For instance, building on the metrics defined to assess learner’s behaviour and attitude. Such a model will be useful for evaluation purposes and to assess to what extent e-learners can enrich their experiences through technology utilisation.

The difference between applying UX research in e-learning and other domains is obvious. For instance, applying UX in e-commerce aims to increase product efficiency and support the user in his/her actions (e.g. purchasing a DVD). But in e-learning, the e-learner is expected to spend time to learn, communicate and share experiences and values with others, face challenges and may struggle to achieve his/her final learning goals. Hence, it is quite challenging to measure learner achievements especially if we consider the different learning possibilities/paths (i.e. learning process) learner can take during his/her learning journey [11]. e-Learning research is best described as complex system includes communities, technologies and practices that are informed by pedagogy (i.e. theory and practice of teaching, learning and assessment). This is combination of technology and pedagogy that allows experimentation to generate further insights and willingness to engage different learning communities in a set of e-learning practices [12].

In the light of the previous discussion and for the purpose of this research, e-learner experience is defined as a special type of user experience where the cognitive aspects such as knowledge and values acquired; socio-cognitive aspects such as relationship with the community; and the mechanism of learning

(i.e. learning processes along with their pedagogy) form the foundation of the e-learner perception and responses. The previously-mentioned definition of e-learner experience needs to be decomposed in order to identify the constituent constructs of the e-learner experience model as well as the potential approaches to measure the changes (i.e. enhancements or descents/declines) that could happen during a learner’s learning journey.

The importance of this model stems from its role in the process of e-learning research and innovations. As explained in figure 1, e-learning research process starts with identifying the limitations in current approaches which could be considered as drivers/motivations for the new research, then making the technological interventions through research, design and development phases. Applying research outcomes (i.e. artefacts) should bring certain enhancements to learning experience that need to be measured or proven by some evidences. Generally, the enhancements technology bring to learning can be classified into different clusters. For instance, they could be related to: (i) information and support provided to learners, (ii) learner performance or (iii) learner satisfactions [13].

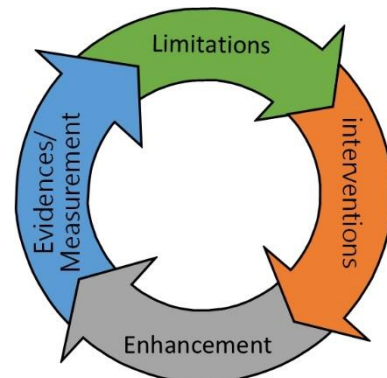


Figure 1: The Cycle of e-Learning Research and Innovations

Or they could be classified into: (i) operational improvements such as flexibility, (ii) quantitative changes in learning such as test scores or (iii) qualitative changes in learning such as reflections and critical awareness [2]. For the sake of this research, enhancements is classified into two categories as shown in figure 2: (i) e-learner-oriented which includes enhancements that are directly related to learner experience and (ii) institutional-oriented which includes enhancements that are related to the institution or any of its components such as instructors, teaching/learning process, regulations/systems, its relation with the community, etc.

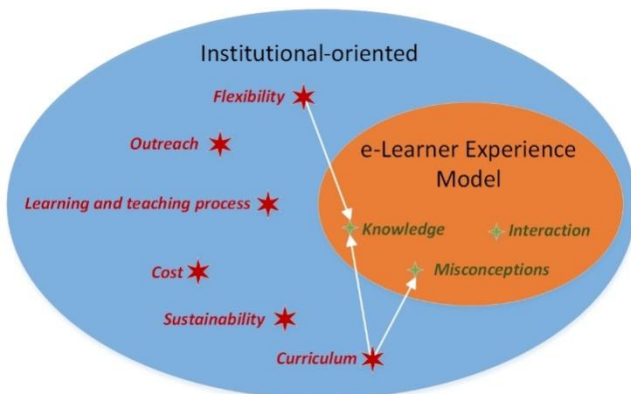


Figure 2: The Classification of the Enhancements of e-Learning

This research is mainly concerned with the first category, learner-oriented enhancements, which will be called e-learner experience model. This is based on the finding that putting learner and his experience at the centre of active learning process results in better learning practices [14]. Restricting this research to the e-learner-oriented enhancements does not controvert the fact that some of the institutional-oriented enhancements influence the e-learner experience such as curriculum and flexibility, while some others such as the cost does not have that impact on the e-learner experience. So, institutional-oriented enhancements remain for future research.

3. e-Learner Experience Model Constituent Constructs

Findings from current e-learning literature artefacts explain that learner experience is conceived, to large extent, as quantitative changes in (i) learner's knowledge that is assessed by assessment elements such as exams or (ii) learner behaviour and satisfaction that is assessed by self-completion surveys [15]. However, the proposed e-learning experience model is an attempt towards identifying an extended list of constructs and potential approaches to measure them. To achieve this goal, a wide range of e-learning models have been investigated. These models stretch from simple models (e.g. learning objects [16]) to complicated systems (e.g. intelligent tutoring systems [17, 18], adaptive system [15, 19]) and from classical systems (e.g. learning management system [20]) to research-based artefacts (e.g. recommended systems [21-24], game-based[25], immersive-based system [26]). This investigation leads to identifying eight main concepts for e-learner experience model as they are detailed in the next paragraphs.

The first construct is the knowledge and skills. In most e-learning settings such as universities, module

learning outcomes form the base for the expected learner's behaviour after completing the module. Learning outcomes are combinations of knowledge to be acquired and skills/competences to be developed. Knowledge refers to the mastering, understanding or the state of knowing a particular concept of the module being taught, while skills reflect the learner's abilities to apply acquired knowledge in actual case. Differentiating knowledge and skills is important because they usually represent theory and practice, respectively. For instance, effective writing of a computer programme that needs analytical, logical and integration abilities (i.e. skills) differs from knowing how to write a programme in a certain programming language (i.e. knowledge). Learner goals are enclosed as well, because learners' goals are focused around acquiring knowledge and skills. This includes goals identified by instructor in formal settings or by learners in self-regulated learning (SRL) settings (i.e. they are named as proximal goals because they represent the breakdown of goals defined by instructors) [27]. Second, the overall assessment results of learning outcomes which can be done through exams, projects, essays or similar comprehensive assessment elements. These comprehensive assessment elements can provide reasonable results however and for the purpose of improved adaptive e-learning processes, fine-grained modelling techniques for e-learner experience are needed so that generating flexible learning paths to learners becomes possible. This is based on the assumption that exams and other comprehensive assessment elements (i.e. course-grained) assess the overall learning outcomes attained by a particular learner, but simpler and fine-grained assessment elements such as quizzes that follow each learning unit are used to assess learner understanding for that particular topic/concept. Third, e-learner misconceptions represent errors/mistakes inside the learner's mind. They will be stored in his model as a subset of the overall misconceptions modelled about a topic.

The previously-identified three constructs are the basic individual constructs that constitute e-learner experience model. The remaining constructs are either related to the social dimension or the advance individual perspective. The social dimension of learning is an important factor because it deals with the social interaction of the learner and his relation with the community. This importance of this dimension differ from one learning approach to another. For instance, it is crucial in situated learning where the learner knowledge is shaped by his relation to the community. The latest top 100 tools used in education

survey reveals the high use of social tools (e.g. social networking, podcasting, RSS feeds, blogging, sharing) in e-learning. But due to the scope of this research, this social dimension cannot be fully analysed and measured. Instead, it will be broken into the following two sub-constructs: (i) learner interaction with the community (the Fourth construct of the model) and (ii) the social presence which has been simplified to annotations that represent comments, tags, shares, and likes learner gets when publishing his/her artefacts (the Fifth construct of the model).

Six, support provided to the e-learner should be taken into account as well. Support can be technical to help learner accessing the system capabilities. Referring to this research scope, technical help has no considerable impact on the e-learner experience model since it will be measured by other metrics/attributes such as satisfaction. The other type of support, which is important in this research, is the academic support which is an intervention to help a learner to progress in his/her learning journey. This academic support can be divided into two types: (i) negative-based academic support which is made by instructors, or other academic roles such as facilitators, based on negative assessment indicators e.g. to correct a learner misconception and (ii) positive-based academic support which is made by instructor or other academic roles to encourage advanced learners to progress e.g. providing additional resources for learners who are eager to learn more, faster or in a reflective way. The negative-based support decreases learner's skills and knowledge, while positive-based support gives an indicator for reflective learner skills.

Seven, time-on-task construct is divided into the following sub-constructs: (a) interaction activities where learners are encouraged to spend more time in a meaningful way to build knowledge through participation (i.e. named as engagement, the more time spent by a learner to use the interaction tools the more engaged with the system he is) and (b) learning speed which refers to the time of consuming a learning unit by a particular learner. There is a time period identified by the instructor for each learning unit, so the learner is expected to approximately use that time. Two different indicators can be taken from this construct. If a large number of learners exceeded the specified time limit of a given learning unit, then this learning unit might be difficult or not well-designed, so there is need to re-design it again by the instructor and with the help of other supportive team members such as instructional

designers. However, if a learner: (i) consumes a particular learning unit in less than the specified time and (ii) scores high in the assessment element, then he is an advanced learner. Yet the main criteria here is to achieve the goals of the learning unit rather than time spent to do so.

Eight and finally, the learner ability to think critically. This includes higher order thinking skills such as meta-cognitive skills that help learner to regulate her/his learning and to be more reflective [28]. Critical thinking and higher order thinking are used interchangeably in this research since they refer to skills that include critical, reflective, metacognitive and creative thinking skills [29]. However, some researchers, use critical thinking as a form of higher order thinking or problem solving. This construct is a pure qualitative one and will be evaluated by: (i) instructor, (ii) positive support and (iii) looking at the meta-cognitive skills in the e-learner model. So, the more successful self-regulated learning processes taken by a learner the more thorough he is because a learner cannot has reflection qualities unless he master other metacognitive skills such as self-management, finding suitable resources, etc. As a final remark, the proposed e-learner experience model focuses on two aspects. A) The objective data rather than subjective and this is the reason for excluding e-learner self-completion survey/constructs such as affects (e.g. boredom). These constructs can be used to provide different treatments for the e-learner but not to evaluate his/her experience, for instance, to provide game-based learning or interesting contents for bored e-learners. However, e-learner will be judged based on the achievement of the learning outcomes not his/her affects.

B) The focus goes to quantitative data rather than qualitative. Quantitative data includes: e-learner behaviour such as grades, assessment results, system usage data, completion rate, and further evaluation approaches such as evaluation tests by technical team, etc. Other qualitative data such as open-ended questions in surveys, interviews or observations should be quantified to help in producing suitable conclusions. In this way, the proposed e-learner experience deal with objective and quantitative data. Table 1 describes the constituent constructs of the e-learner experience model, the tendency for each of construct which summarises the aim of the ideal system whether to increase this construct or to decrease it, quantification approach and measurement considerations.

Table 1: e-Learner Experience Model Constituent Constructs

#	Construct	Tendency	Quantification approach	Key methods to measure
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1	<i>Knowledge</i> : understanding of a particular concept and <i>Skills</i> : learner's ability to act upon the acquired knowledge to achieve a goal.	Increase	The percentage of known to the unknown concepts in a scale from 1, the least, to 10, the best.	Concepts of a module are modelled in a certain way (e.g. subject ontology) and learner knowledge is modelled as an overlay model with percentage of understanding of each concept. Evaluation results come from the assessment construct of the learning unit.
2	<i>Misconceptions</i> : errors in learner's conceptualisation	Decrease	Percentage of the e-learner misconceptions to the overall misconceptions modelled in the system.	Modelled misconceptions are stored in the subject ontology.
3	The <i>overall assessment results</i> (e.g. exams) which is suitable for comprehensive assessment	Increase	The results of the assessment element are modelled in the e-learner model from 1 to 10.	Results come from comprehensive assessment elements that assess learner's learning outcomes.
4	<i>Interaction</i> with learning community that includes learners and instructor	Increase	This includes: (i) the number of actions performed by the learner to interact with learners and instructor via different tools e.g. email, forums, and other web 2.0 tools; and (ii) the quality of learner interaction.	For simplicity the quality of learner interaction is not considered in this research because it needs further details such as using education data mining (EDM) techniques, e.g. to extract the most written words by a learner in the forum and analyse them to get some quality indicators.
5	<i>Social presence</i> of the e-learner: it is an indicator on the use of the learning environment by the learner.	Increase	The number of annotation the e-learner has. Annotation refers to the number of comments, shares, likes, tags, the learner get from the member of his learning community when he produces an artefact.	The use of annotation encourages learners to work in groups and to be socially active, but further analysis techniques are left for future research.
6	<i>Academic support</i> provided to the learner			
6.1	<i>Negative-based</i> academic support: interventions based on negative assessment indicators	Decrease	Number of negative-based academic interventions.	Should be linked with the concept that learner is working on at the time of providing support.
6.2	<i>Positive-based</i> academic support: interventions to encourage advanced learners to progress	Increase	Number of positive-based academic interventions.	This gives an indicator for reflective learner which is considered as a way to quantify the e-learner reflection abilities.
7	<i>Time-on-task</i> : time spent by a given learner on a specific task (learning or interaction tasks). This gives indication for engagement and learning speed.			
7.1	<i>Learning speed</i> : time spent by the e-learner on a specific learning task	Stable	The time span with which the learner is involved in consuming a learning unit. This can be measured by comparing the time of use with the time attached to every learning unit.	Learning speed is not the criteria for to judge to what extent this learning content is understood by the learner. But it will be used to give indications regarding the learning content design.
7.2	<i>Engagement</i> : time spent by the e-learner on participatory learning approaches such as blogging, interacting with the learning community.	Increase	Time-on-task can be calculated by minutes or other time units to measure the use of collaborative activities such as discussion, wiki, etc. where the aim is to increase.	For the context of this research, engagement attribute has been separated from the interaction and social presence (i.e. annotation) of the e-learner. Further future research is recommended to investigate the correlation between these attributes specially the quality of learner interaction. This requires the use of specific learning analytics and EDM techniques in the context of big data or large data set.
8	<i>Critical thinking</i> : learner ability to reflect and learn thoroughly.	Increase	This is a qualitative construct, but it can be quantified by the assessment results of the advanced questions and the number of successful SRL processes taken by a learner.	The relation between SRL (i.e. metacognitive) skills and high quality learning (i.e. higher order thinking process or skills) is based on the assumption that both of them are tightly coupled to each other.

4. e-Learner Experience Model: Structural and Measurement Perspective

Combining both measurement and structural perspectives is inevitable to bring success to technological artefacts that deal with behaviour[10]. Simply, measurement perspective is concerned in defining model's qualities (e.g. interoperability) along with rigorous measures to allow measuring the overall user experience or other aspects that model would like to measure. While structural perspective is of explanatory or predictive models that are established to understand and predict the relations between the model's constructs [30]. For instance, the less misconception the learner has the better for his/her knowledge and skill. Similarly the less negative-based support is the better for his/her experience model. Knowledge and skills gained through the learner's learning journey represent the backbone of the e-learner experience, therefore all other constructs are investigated in terms of their impacts on knowledge and skills.

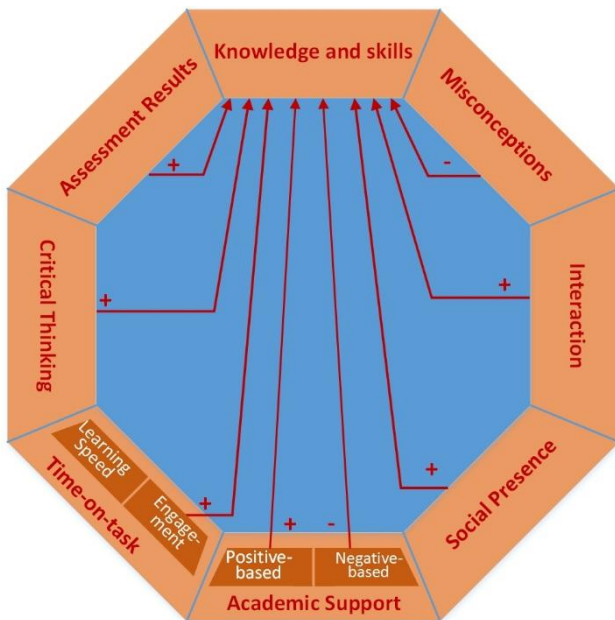


Figure 3: e-Learner Experience Model: a Structural View

The rest of the model's constructs (i.e. interactions, social presence, positive-based support, engagement, critical thinking and overall assessment results) are positively impacting the knowledge and skills construct. For instance, better assessment results lead to better experience and so on. Based on the explanatory investigation of e-learning literature, especially learner modelling, the eight constructs of

the e-learner experience model along with their relationships are represented in figure 3.

Analysing the relationship between these eight constructs helps, in support with proper literature, in assigning proximate weights for each construct. Due to the importance of the *first construct, knowledge and skills*, the approximate weight that will be given to this construct is 0.3 and it will come from the quizzes given to learner after each learning unit. *Second, the misconception* which comes from repeated mistakes of the e-learner minimises the e-learner abilities to act up on the learnt knowledge. For instance, one of the misconception in the confusion between area and perimeter. So, the e-learner still has a level of knowledge and skills but he fails to respond correctly until the misconception is being resolved. Therefore, misconception is assigned the value 0.1.

Third, assessment results that come from comprehensive assessment elements such as exams and projects, mostly give indicators to coarse-grained or high-level of the e-learner understanding. Therefore, it is assigned 0.2. *Fourth, the social dimension* of the learning process which includes both *interaction* and *social presence* contributes to the socially-constructed and shaped knowledge and experience. Findings show that the usefulness of this dimension if it has been managed and monitored well. Hence, this construct is assigned 0.1. *Fifth, the academic support*, both *negative* and *positive-based*, affects the learner knowledge in different ways. Positive-based support indicates the well-progress of the learner and should increase the e-learner's knowledge and skills and consequently the e-learner experience. Yet the negative-based support indicates some of the misconception or missing conceptions that the e-learner has. This construct, academic support is assigned 0.1. *Sixth, time-on-task* is also divided into: (i) *learning speed* and (ii) *engagement*. Only engagement is assigned 0.1 and it has been treated separately from the social dimension for the sake of data objectiveness. This decomposition allows better future investigation of correlation between different constructs. *Finally*, the critical thinking which also contributes positively to the e-learner knowledge and skills and consequently his experience model is assigned 0.1. Table 2 shows the proposed weights and collection methods.

Table 2: Model Constructs Weights and Measurement

#	Construct	Weights %	How to be measured
1	Knowledge and skills	30	Quizzes delivered to learners after e-learning services

2	Misconceptions	10	Quizzes
3	Assessment results	20	Exams or other overall assessment tools
4	Interaction	5	System collected data of the number of interactions with learning community members
5	Social presence	5	System collected data of number of the e-learner's annotations
6	Negative-based academic support	5	Number of instructor or system interventions based on negative indicators
7	Positive-based academic support	5	Number of instructor or system interventions based on positive indicators
8	Engagement	10	Time spent on interaction
9	Critical thinking	10	Instructor assessment and successful SRL processes

5. e-Learner Experience Model: A Proposed Scale

In order to allow a clear measurement mechanism, there is a need to adopt or define a scale where the previously-presented criteria can be measured. One of the widely-adopted scales for this purpose is Likert scale. This scale refers to a set of statements to which the respondents rate their own degree of agreement or disagreement. More specific, 5-point scale is one of the variations of Likert scale that is commonly used. It is composed of: (i) strongly disagree, (ii) disagree, (iii) neither agree nor disagree, (iv) agree and (v) strongly agree. Some researchers prefer 7-point scale but this makes it harder to find proper descriptive terms for each degree [31]. 5-point Likert scale is adopted in this research because: (i) it is simple to construct, its neutrality due to the use of odd numbers of responses and (iii) can produce a highly reliable scale despite of some limitations in specific cases such as avoiding extreme response categories.

Consequently, the next section addresses how each of the previously-identified constructs (e.g. knowledge) will be assigned a certain value (e.g. 3 out of 5). Both knowledge and assessment will use the results of quizzes and exams, respectively, converted to a scale ranging from 1, the least, to 5, the highest degree. In addition, the proposed e-learner experience model consists three socially-constructed constructs which are: interaction, social presence and engagement. As a way to make this experience model generic so it can be used in different courses, these three constructs work on the base of thresholds that are defined by the instructor or other concerned roles. For instance, instructor has to assign the suitable level of interactions (i.e. number of expected messages to be sent by the e-learner, expected number

of annotations and time spent on interactions). For instance, if the number of the emails that should be sent by the learner is 10, then 1 refers to learners who send one email, 2 refers to learners who send two or three emails, 3 refers to learners who send four or five emails, 4 refers to learners who send six or seven emails, 5 refers learners who send eight emails or more. This threshold can be general per all interaction tools (i.e. email, wiki, forum, etc.) or specific per each tools (e.g. 10 email messages and 5 posts on discussion forum).

This customisable threshold allows more flexibility as instructors know the best suitable techniques for their own modules, whether a considerable or minimal emphasis should be placed on communication and other social tools. In such way, instructor, or other concerned technical and academic staff, can maximise, minimise or even eliminate (i.e. zero-threshold) the role of social dimension in their modules. Adopting zero-threshold means that this module/course focus goes away from situative-based learning approaches towards pure behavioural ones. Similarly, a threshold should be assigned by the instructor for positive-based and negative-based academic support attributes. Again, this allows flexible learning management and interpretation for the results of the e-learner experience model. For instance, assigning a high number to the positive-based support, which is related to learner reflection, indicates that this module needs a critical thinking skills. Hence, it is not expected to see the same positive-based academic support threshold for two different modules whereas the first module is designed for first-year students and the second module belongs to MSc/PhD programme. Finally, the critical thinking/learning skills construct is quantified by the percentage of successful SRL processes to the overall successful learning processes taken by a particular learner. The threshold here is the number that represents half of the successful learning processes for a particular learner. For instance, if a learner has 20 successful learning processes in his behavioural model then 10 is the threshold for the critical thinking attribute. Hence, if that learner has 3 SRL successful processes then he will be given 2.

Table 3:e-Learner Experience Model Proposed Scale

#	Construct	1	2	3	4	5
1	Knowledge and skills	0-19 %	20-39 %	40-59 %	60-79 %	80-100 %
2	Misconceptions	100-80 %	79-60 %	59-40 %	39-20 %	19-0 %
3	Assessment results	0-19	20-39	40-59	60-79	80-100
4	Interaction	0-19	20-39	40-59	60-79	80-

		%	%	%	%	100 %
5	Social presence	0-19 %	20-39 %	40-59 %	60-79 %	80-100 %
6	Negative academic support	100-80 %	79-60 %	59-40 %	39-20 %	19-0 %
7	Positive academic support	0-19 %	20-39 %	40-59 %	60-79 %	80-100 %
8	Engagement (part of time-on-task)	0-19 %	20-39 %	40-59 %	60-79 %	80-100 %
9	Critical thinking	0-19 %	20-39 %	40-59 %	60-79 %	80-100 %

6. Discussion and Reflections

The proposed e-learner experience model is an attempt to understand the behaviour of e-learners by modelling the constructs that affect his/her experience. One of the challenges here is the external influences of the e-learner experience. For instance, developing the learning and teaching processes taken by a specific institution or adopting advanced innovations in teaching will impact the e-learner experience in a way or another. Additional challenge is the difficulty of deciding which construct affect the others and how because of mixing different concerns in learning processes. For instance, some e-learners may spend extra time on a specific learning task not due to bad content design consideration but because of some usability issues. It is challenging to isolate these concerns from each other's and consequently it is difficult to act upon the evaluation results, do is it the issue of content design or interface?

Furthermore, providing further focus on the quality instead of quantity of data is problematic in such distributed environments. This is due to the difficulty of collecting quantitative and objective data and to the nature of data itself. Some data constructs require different treatment techniques/scales. For instance, learner interaction with tools might be taking different time intervals due emotional reasons or learner's willingness to learn this topic. Additionally, tracking every single action done by the e-learner will complicate analysing his/her data and consequently taking the right decision. For instance, there could be a possibility for enhancing the quantification approach of the higher order/critical thinking skills through assigning a specific attribute for each question in any online assessment element, so the system can have a better idea about learner's reflection abilities (e.g. adding this pair {skill: reflection, topic: requirement analysis} to each question in the exam/quiz). Yet this will increase instructor's effort in designing assessment elements and may minimise their use for these technologies.

7. Conclusion

In this paper researchers introduce an e-learner experience model to understand the impact of e-learning on e-learner experience. The proposed model combines both e-learning literature with user experience/usability research in order to develop a model that addresses the research concerns and at the same time responds to the particularities of e-learning domain. Hence, the unique contribution of this model is the derived e-learner experience model and its constituent constructs, the weights assigned to these constructs based on measurement and structural analysis and finally the proposed scale to assess each of these constructs. This work leaves the door open for extending this e-learner experience model to cover institutional-oriented enhancements caused by e-learning technologies and investigating the interrelationships between these learner-oriented and institutional-oriented constructs.

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